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PATENT

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Susanne Arney, *et al.*

Serial No.: 09/706,274

Filed: November 3, 2000

Title: OXIDATION SENSOR FOR AN ELECTRICAL CIRCUIT AND A METHOD OF MANUFACTURE THEREFOR

Grp./A.U.: 1743

Examiner: Soderquist, Arlen

Honorable Commissioner of Patents
Washington, D.C. 20231

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner of Patents and Trademarks, Washington, D.C. 20231, on 12/12/2002 (Date)
EDITH SHEK Printed or typed name of person signing the certificate)
Edith Shek
(Signature of the person signing the certificate)

Sir:

AFFIDAVIT UNDER 37 C.F.R. §1.131

State of New Jersey §
§
§
County of Middlesex §

Susanne Arney, being duly sworn, deposes and states:

1. I am the inventor of the claimed subject matter in the Patent Application identified above and the inventor of the subject matter described therein.

2. Prior to August 1, 2000, co-inventors David Bishop and Herbert Shea and I conceived and actually reduced to practice an oxidation sensor for an electrical circuit that includes a sensor trace configured to oxidize at a rate greater than an oxidizable electrical component associated with the sensor trace when the sensor trace and the electrical component are exposed to a same oxidizing environment, as covered by the above-identified Patent Application, as evidenced by the following:

a. Notations of the conception entered in the lab-notebook of Herbert Shea and witnessed by myself prior to August 1, 2000. The lab-notebook is kept in the regular course of business. A true and correct copy of the pertinent pages from the lab-notebook are attached hereto as Exhibit A. Any dates omitted from Exhibit A are prior to August 1, 2000.

b. After the conception of the invention, information necessary for subsequent filing of the above referenced Patent Application in the United States Patent and Trademark Office was prepared. Consequently, the application was diligently prepared and filed with the USPTO on November 3, 2000.

3. I have not retained any rights in the Patent Application identified above.

4. I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or

imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the Application or any patent issuing thereon.

Susanne Arney

Sworn to and subscribed before me this 25 day of November, 2002.

Notary Public

EXHIBIT A

COPIED FROM THE LAB NOTEBOOK of HERBERT R. SHEA

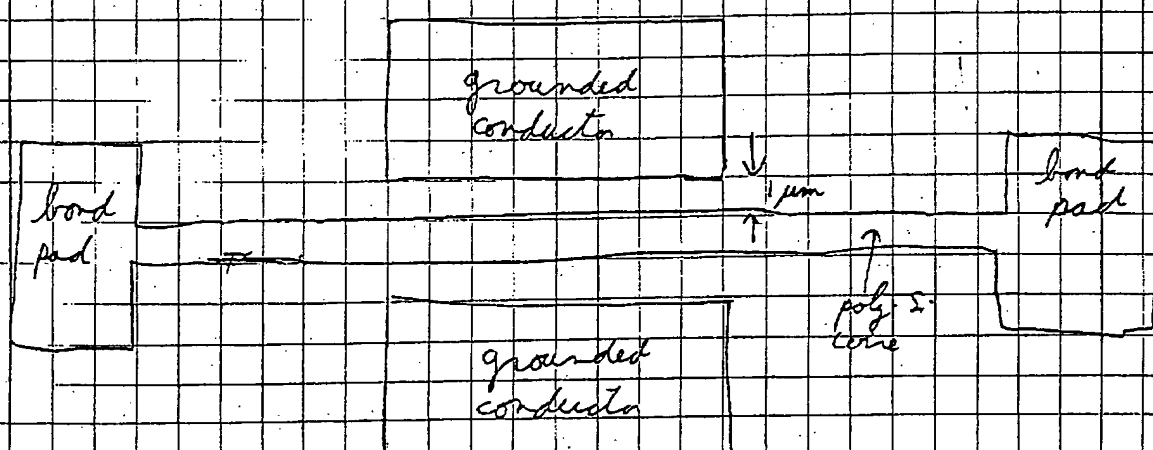
DESIGN OF SYSTEM FOR EARLY WARNING OF ANODIC OXIDATION AND CORROSION OF POLY-SILICON WIRING

In environments with high humidity and at high voltages (>10 V), we observe anodic oxidation of unpassivated poly-Silicon wires and electrodes. Only the most positively biased Si structure is oxidized.

The smaller the gap between electrodes, the more rapid and more efficient the oxidation. As can be seen on the SEM micrographs on p. 102, the Si wire is oxidized when only a 2 μm gap exists between it and grounded Si structures. But when a 3 μm gap separates the wire from grounded surfaces, the oxidation is drastically slowed.

Currently, the smallest gap used in our electrodes is 2 μm. We therefore suggest the following setup which will have a wire that will fail (open circuit) well before wires with 2 μm gaps:

- Make a structure consisting of a ~~a~~ thin (~2 μm wide) poly-Si wire held at ~150 V dc (or ac) that is only 1 μm away from grounded surfaces, as illustrated below.



H R Shea

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continued →

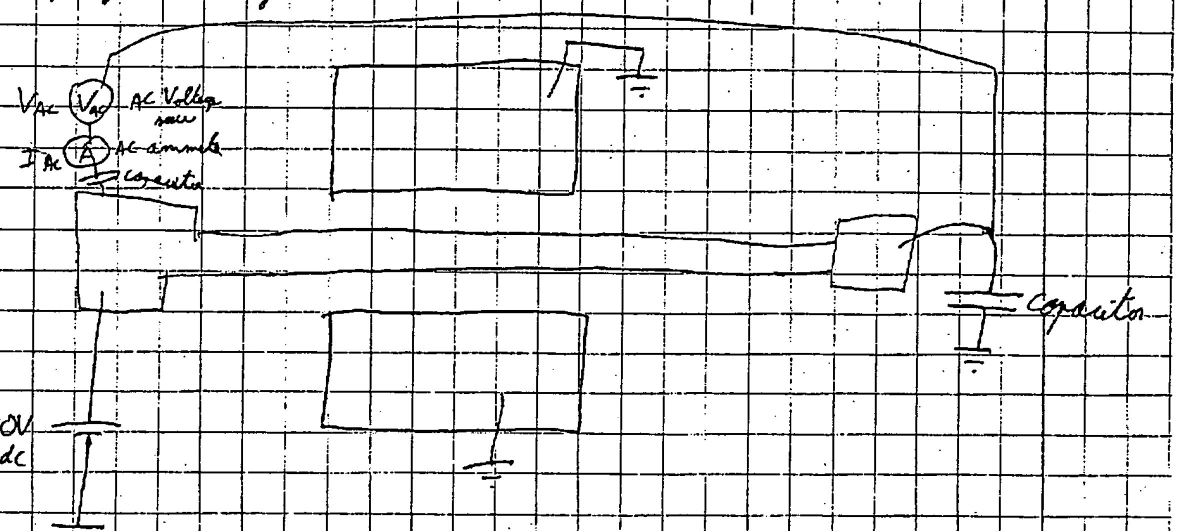
The structure above needs to packaged ~~the~~ with the chip/system it is to monitor

By testing periodically the continuity and resistance of the poly Si wire between the two bond pads, one can determine when the wire begins to oxidize

By design this wire will oxidize well before any wire or electrode in the system we are monitoring (since all gaps are 2 μm or greater there)

An increase in resistance of the test wire signals the beginning of oxidation.

To be effective the wire must constantly be held at an elevated positive potential. Below we illustrate a scheme to enable ac measurement of the resistance while keeping a large dc bias on the wire



$$R_{wire} = \frac{V_{AC}}{I_{AC}}$$

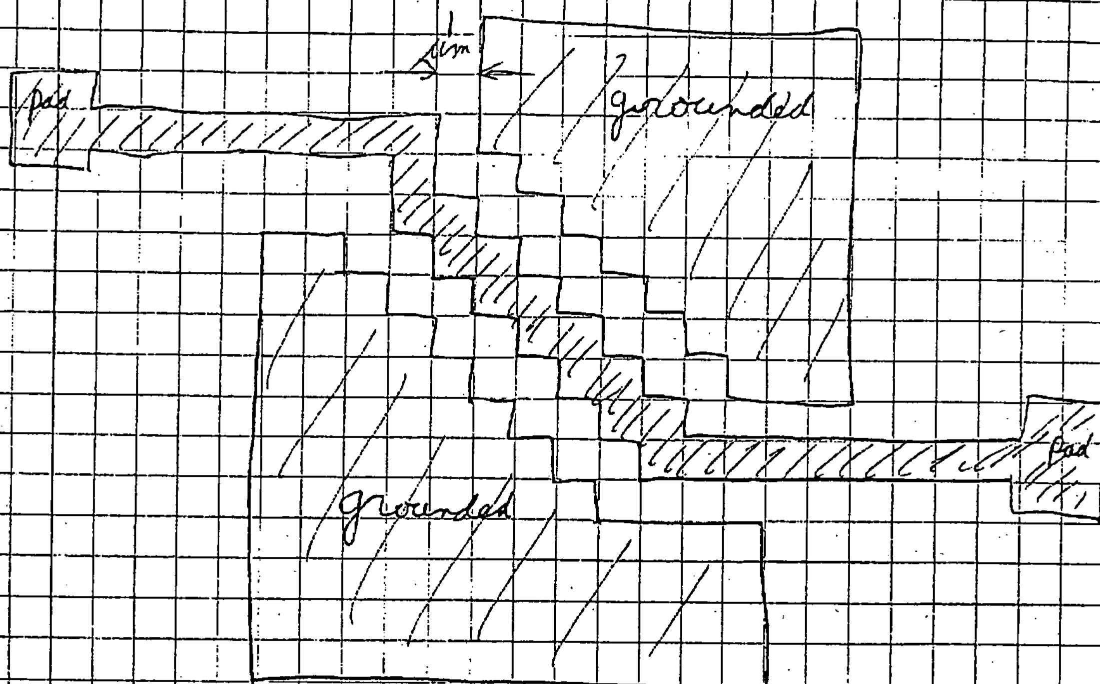
Read and Understood

[signature]

Susanne Arney

[signature]

Since the electric field is concentrated at sharp bends and corners, a more efficient structure (in terms of oxidation) than the one drawn schematically on p 106 would incorporate many 90° bends, as drawn below:



Read and Understood

Susanne Heney